TEST WEDNESDAY

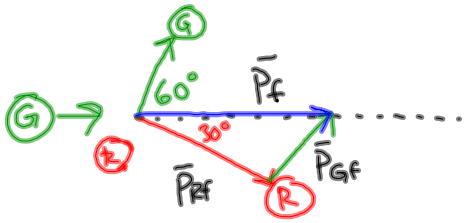
- Impulse-Momentum thm.
- Conservation of Momentum
  - 1-D collisions
  - 2-D collisions

Green ball → $m_G = 10\ kg$, $\bar{v}_{Gi} = 20\ m/s$ to the east

Red ball → $m_R = 12\ kg$, $\bar{v}_{Ri} = 0\ m/s$

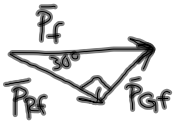
After collision, green moves at 60° N of E.
Red moves at 30° S of E.

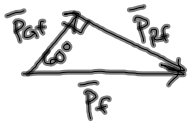
Find final velocities of both.



$$\bar{P}_i = \bar{P}_f$$

$$\bar{P}_f = \bar{P}_{Gi} = m_G \bar{v}_{Gi} = 200\ kg \cdot m/s$$





$$\cos(30°) = \frac{P_{Rf}}{P_f}$$

$$P_{Rf} = P_f \cos(30°)$$

$$= 173.2\ kg \cdot m/s$$

$$P_{Rf} = m_R v_{Rf}$$

$$v_{Rf} = \frac{P_{Rf}}{m_R} = 14.3\ m/s$$

$$\sin(30°) = \frac{P_{Gf}}{P_f}$$

$$P_{Gf} = P_f \sin(30°) = 100\ kg \cdot m/s$$

$$P_{Gf} = m_G v_{Gf}$$

$$v_{Gf} = \frac{P_{Gf}}{m_G} = 10\ m/s$$

Golf Ball Impulse Lab

Goal: to find Force

$$\bar{F}\Delta t = m\Delta\bar{v} \qquad m = 0.050\,kg$$

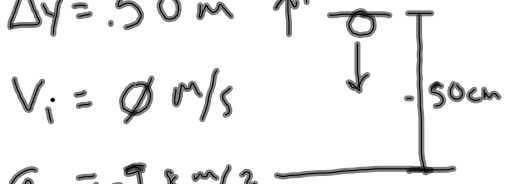
$$\bar{F} = \frac{m(\bar{v}_f - \bar{v}_i)}{\Delta t}$$

Drop

$\Delta y = -.50\,m$

$v_i = 0\,m/s$

$a_g = -9.8\,m/s^2$



$$v_f^2 = \cancel{v_i^2} + 2a_g\Delta y$$

$$v_f = \sqrt{2a_g\Delta y}$$

Bounce

$\Delta y \rightarrow$ measure this from the meterstick

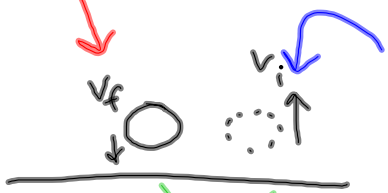
$v_f = 0\,m/s$

$a_g = -9.8\,m/s^2$

$$\cancel{v_f^2} = v_i^2 + 2a_g\Delta y$$

$$v_i^2 = -2a_g\Delta y$$

$$v_i = \sqrt{-2a_g\Delta y}$$



* Use a positive Δy in equation

$$\bar{F} = \frac{m(\bar{v}_f - \bar{v}_i)}{\Delta t}$$